

## PATENT COOPERATION TREATY

PCT


REC'D 12 SEP 2005

## INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

WIPO PCT

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference L 2207 PCT	<b>FOR FURTHER ACTION</b> See Form PCT/PEA/416	
International application No. PCT/US2004/026500	International filing date (day/month/year) 13.08.2004	Priority date (day/month/year) 27.09.2003
International Patent Classification (IPC) or national classification and IPC G02B26/02		
Applicant 3M INNOVATIVE PROPERTIES COMPANY et al.		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau) a total of 2 sheets, as follows:</p> <p><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand  27.07.2005	Date of completion of this report  09.09.2005	
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  Daffner, M  Telephone No. +49 89 2399-7087	



**INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY**

International application No.  
PCT/US2004/026500

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

**Description, Pages**

1-14 as originally filed

**Claims, Numbers**

1-22 received on 27.07.2005 with letter of 27.07.2005

**Drawings, Sheets**

1/3-3/3 as originally filed

☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT  
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International application No.  
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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	1-22
	No: Claims	
Inventive step (IS)	Yes: Claims	1-22
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-22
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

The examination is being carried out on claims 1-22 as filed with letter of 27.07.05.  
The documents referred to in the examination are numbered in the order of citation in the search report.

- 1 The display device defined in claim 1 is switched by electrolytically generating gas in a chamber containing an electrolytic liquid.
- 1.1 Document D2 discloses a bistable display device switched by electrocapillary effect.
- 1.2 Optical switches in which a fluid is electrolytically converted into gas are known from documents D1 (US 4 988 157) or D3 (US A 5 978 527).

There is however no indication for the skilled person apparent to apply the teaching to generate electrolytically a gas bubble in optical switch to a display device.

- 1.3 Thus the claimed display device is novel and inventive.

\* \* \* \* \*

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July 27, 2005

## NEW CLAIMS

1. <sup>A</sup> Display device ~~capable of irreversibly switching from a first indicating state to a second indicating state, the~~ ~~(display) device comprising:~~ ~~(comprising a)~~
- a chamber (14) containing an electrolytic liquid (16) and having at least one exit opening (46), and
  - at least two electrodes (22, 24) located in said chamber (14) and in contact with said electrolytic liquid (16) as well as subjectable to electric voltage,
  - wherein, upon application of electric voltage of a predetermined level to said electrodes (22, 24), gas is generated in said chamber (14) causing the pressure within said chamber (14) to exceed a threshold value such that liquid ~~irreversibly~~ exits said chamber (14) through said at least one exit opening (46) thereby ~~switching from the first indicating state to the a~~ <sup>the display</sup> <sup>a</sup> second indicating state.
2. Display device according to claim 1, further comprising a receiving space (50) for receiving liquid (16) exiting said chamber (14) through said at least one exit opening (46) when the pressure therein exceeds the threshold value.
3. Display device according to claim 2, further comprising a porous element (32) arranged within said receiving space (50) and for sucking-up liquid (16) entering said receiving space (50) from the chamber (14).

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electrolytic liquid (16) up to said at least one exit opening (46) and wherein electrolytic liquid (16) exits through said at least one exit opening (46) when the pressure within said chamber (14) exceeds the threshold value.

18. Display device according to any one of claims 1 to 16, wherein within said chamber (14) between said electrolytic liquid (16) and said at least one exit opening (46) there is arranged an indicating liquid (102) exiting through said at least one exit opening (46) when the pressure within said chamber (14) exceeds the threshold value.
19. Display device according to claim 18, wherein said indicating liquid (102) is immisible with the electrolytic liquid (16).
20. Display device according to claim 18 or 19, wherein said indicating liquid (102) and said electrolytic liquid (16) are separated by a flexible membrane.
21. Display device according to any one of claims 1 to 20, wherein said liquid (16) exiting through said at least one exit opening (46) when the pressure within said chamber (14) exceeds the threshold value is coloured.
22. Display device according to any of claims 1-21, where the display comprises an electrochrome display, electroluminescent display, or a LCD (liquid crystal display).